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fourth quarter report 1972

(NASA-CR-131568) [RESEARCH PROGRESS ON
DISEASE DATA BANK AND DATAON SYSTEMS]
Quarterly Progress Report, 1 Nov. 1972 -
31 Jan. 1973 (University of Southern
Calif.) 45 p HC \$4.25 CSCL 05A G3/34 17581
N73-22914
Unclas

WESRAC

WESTERN RESEARCH APPLICATION CENTER

GRADUATE SCHOOL OF BUSINESS ADMINISTRATION / UNIVERSITY OF SOUTHERN CALIFORNIA
LOS ANGELES, CALIFORNIA 90007 (213) 746-6133



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I

I. INTRODUCTION

LETTER OF INTRODUCTION:

The following is a progress report of operations for the fourth quarter by period, 1 November - 31 January, 1973, of the Western Research Application Center (WESRAC), a Regional Dissemination Center at the University of Southern California. A description of new developments and specific statistics for the fourth quarter is provided.

The report has been prepared in accordance with the printing specifications in Article XV of NASA Contract No. NASW-2360, a two year agreement between the University and the National Aeronautics and Space Administration for the operation of WESRAC. Distribution is in accordance with Article VII of the same contract.

WESRAC has operated since 1967 at the University of Southern California, Los Angeles, as a division of the Graduate School of Business Administration and under the administrative and financial control of the USC Research Institute for Business and Economics.

Additional facts on activities included in this report are available if desired.

A. Kendell Oulie
Director

II. GENERAL OVERVIEW - ADMINISTRATION

NEW DEVELOPMENTS

A WESRAC executive workshop program has been initiated to provide an informal forum for the exchange of ideas and experiences among industrial leaders on innovation in new or improved products and processes. Considerable effort has been directed in stimulating technological innovations in industry and the transfer of technical know-how from the public to the private sector. Much remains to be learned about the innovative process and the various technical, behavioral, and managerial obstacles which limit productivity.

The first of a scheduled series of small workshops was held December 12, 1972, with five top executives in attendance. Some conclusions from the first meeting:

1. Problems of innovation in product and processes are more related to identifying the market demands than to the technical problems involved.
2. Top level executives consider such a meeting worth while because they regularly spend their personal time looking into these problems.
3. The subject appears to have great interest. All executives contacted were interested in participating in this or a later meeting.
4. Such workshops provide an extremely good platform for presenting the WESRAC program to buying level executives.

COMMUNITY ACTIVITIES

WESRAC has continued active participation in both the City of Los Angeles and the Los Angeles Area Chamber of Commerce levels. Committees at both locations have redesigned their titles to reflect emphasis on achieving progress in the area through the use by industry and public organizations of existing technology developments. The Chamber of Commerce Committee is now called the "Technology Use Task Force." The Mayor's Committee is called the "Science and Technology Advisory Committee." Both have dedicated their activity to the use of WESRAC as the technology resource which will be publicized and used whenever possible. The Director of WESRAC has been made an official member of the Mayor's Office with city cards identifying him as a member of the Advisory Board.

Modest funds have been requested by the city from both the State of California and NASA to support work desired by the city from WESRAC.

MAJOR FUNDING EFFORTS

Major funding for WESRAC efforts have been requested this quarter for special projects from both the National Science Foundation and NASA. If either or both are granted, WESRAC will become an extremely well-qualified source of technology to industry and its status in the University will be magnified importantly.

PERSONNEL

While WESRAC sales have increased 10% in 1972, the serious need for professional direction of the sales effort has been a chronic problem. Competition with commercial organizations for top sales management people has always been a major difficulty. However, a decision was reached this quarter to again try to solve this problem in spite of noncompetitive salaries in the academic environment.

Through an advertisement in the Wall Street Journal, over sixty candidates applied for the position of Sales Manager. The process of final selection continues. Much higher salary requirements will be met through commissions paid based on dollar "income" developed or by reducing other activities.

Our feeling at WESRAC is that the market for WESRAC services in the West is still comparatively un-penetrated and that economic conditions for 1973 indicate that the time for more aggressive efforts has come. Despite the lowest budget and financial support ever received, it is hoped that this effort can be implemented without sacrificing other activities and experiments in service.

There has been an 18% reduction in the full-time staff at WESRAC. These reductions occurred in Administration, Technical Operations, and Marketing. Also, there has been a 12% overall reduction in the number of part-time personnel. All of the reduction occurred in Technical Operations. In Technical Operations part-time personnel are hired as the need arises in their technical discipline; thus, the numbers for

Technical Operations personnel represent those that were used during the last month of the quarter.

The number of personnel at the end of the quarter for the third and fourth fiscal quarters are shown in the following chart.

	3rd Q 1972		4th Q 1972	
Dept.	Full Time	Part Time	Full Time	Part Time
Adm.	5	1	4	2
Tech. Oper.	3	18	2	13
Info. Sys.	5	6	5	6
Mktg.	4	0	3	1
Total	17	25	14	22

III. MARKETING & PUBLIC RELATIONS

NEW DEVELOPMENTS

Mini-TIP

In an effort to provide a service beyond WESRAC's standard literature searches, a Mini-TIP program has been formulated. This program permits an ongoing communication with the client, but does not require the financial commitment of a full TIP* (Technology Intelligence Program).

Using a lead from NASA-TU, the Sevenstrand Tackle Manufacturing Company became WESRAC's first Mini-TIP client. The objectives of the program are to improve certain aspects of Sevenstrand's well-known fishing rods and the process for manufacturing them.

TIP

As we gain experience in marketing and operating a TIP contract, we have found that the task-oriented approach is a favored one. Recent proposals have taken this approach. This is discussed more in detail in Section IV (page 17).

"Experiments Toward Innovation" NSF Proposal

University of Southern California with WESRAC as the principal contributor officially submitted its proposal entitled "Experiments Toward Innovation" to the National

*TIP provides systematic, ongoing, customized problem-solving and quest for new opportunities to support the business or industrial organization.

Science Foundation. WESRAC's part of the program is to supply our TIP services to ten companies selected from those responding to our Request for Proposal. The TIP services will be paid for by NSF, and each company in this joint effort will contribute its resources in terms of manpower, facilities, and money for the physical development of a new or improved product or process.

In order to demonstrate to NSF the viability of such a program, we asked a number of companies if they would be interested in participating in such a program if funded, and so indicate by a letter of interest. The response was very gratifying. This approach to companies enabled our marketing representatives to reach people that previously had been unavailable. One new client can be directly attributed to this approach.

Meniere's Disease Data Bank

A new type of clinical data bank was sold to the Los Angeles Foundation of Otology as a result of a lead from the JPL mailing list. A more detailed description of the service is given in Section IV (page 16).

PUBLICATIONS

Design Resources Column

The "Design Resources" column in Design News continues to have a good response of 1.5 to 2.0% per month. These responses, when divided into RDC areas, show about 1,000 each per quarter for ARAC, KASC, NERAC, and WESRAC and about 400 each for NCSTRC and TAC. These responses are provided to the other RDC's for their use.

The number of items checked per individual responding still continues to show good reader interest. The response of individuals and the response by geographical area is shown in the following table.

"Design Resources" Reader Response

4th Quarter

A. Response of individuals

Number of reader service responses:	9,225
Number of individuals responding:	5,013
Average number of items checked per individual:	1.8

B. Response by geographical area

Number of individuals responding in WESRAC's area:	1,034
Number of individuals responding outside WESRAC's area:	3,979

Responses by RDC Areas

ARAC	1,185
KASC	972
NCSTRC	391
NERAC	1,001
TAC	<u>412</u>
Total	3,961

Responses by Foreign Country

Israel	8
Puerto Rico	5
Canada	<u>5</u>
Total	18

Design News is presently providing WESRAC with a gummed label for each "Design Resources" reader response and an additional label for WESRAC's records. The computer addressed labels have reduced the clerical workload associated with the column to approximately one half of its former level. However, the value to WESRAC and the expense of handling four responses from other areas for each one from WESRAC is being evaluated.

Technology Intelligence

The Technology Intelligence newsletter was instrumental in obtaining six clients this quarter. They were introduced to WESRAC via the newsletter. The response from the readership ranged from 1.5 to 2.0% per month.

The topics of the feature articles in each issue this quarter covered a computer gaming simulator called APEX (Air Pollution Exercise), forms of technological forecasting, and application of technology in rapid transit.

A pool was taken of the Technology Intelligence readership. The results for 292 responses are as follows:

<u>Awareness of WESRAC's Function</u>		<u>Interest Level</u>	
Yes	74.5%	Great	26.5%
No	25.5%	Moderate	71.0%
	<u>100.0%</u>	None	<u>2.5%</u>
			<u>100.0%</u>

<u>Respondee's</u>			
<u>Position</u>		<u>Business</u>	
Manager/President	48.3%	Selling	17.9%
Engineer/Scientist	20.2%	Manufacturing	32.5%
Librarian	18.2%	Designing	16.5%
Academic	4.1%	Consulting	18.7%
Other	5.2%	Public Agency	6.9%
	<u>100.0%</u>	Other	<u>7.5%</u>
			<u>100.0%</u>

The reader response to Technology Intelligence for the fourth quarter is indicated below.

Number of responses to particular items:	1,321
Number of individuals responding:	488
Average number of items checked per individual:	2.7
Number of documents ordered:	85
Number of responses from outside California:	3

Guide to WESRAC Services

A folder designed specifically for the individual user in a large client's organization is being developed. The folder will contain search request forms and instructions for initiating a search through WESRAC. The guide is of a practical nature and is intended more as an aid to a WESRAC client rather than as a direct marketing vehicle. The next quarterly report should have information regarding the guide's usefulness and acceptance.

MAILINGS

Distribution of 573 letters directed at patent attorneys in California has resulted in six clients. The primary service to the patent attorney is that of assisting him uncover proof of whether or not a particular idea or device is in the public domain through a retrospective search. In doing so, we provide a means for the attorney's client to avoid patent infringements.

IV. TECHNICAL OPERATIONS

NEW DEVELOPMENTS

Meniere's Disease Data Bank

One of the most unique activities is the development of a Clinical Data Bank to support a five-year Meniere's Disease study at the Los Angeles Foundation of Otology. Using the abstract approach, a patients file has been divided into various parts of interest to specialists in audiograms, allergies, virology, otological surgery, and psychology. Each abstract is indexed with keywords relative to pertinent data on events indicated. The Clinical Data Bank and our DATACON system will be a primary tool in evaluation of the Meniere's Disease study data. The objective of the study is to isolate the multiple causes of Meniere's disease and to evaluate the effects of clinical and surgical treatments. When the data bank is complete it will be a unique set of information which the medical staff is already considering for use in studies of other clinical conditions that the information reflects.

The Data Bank is still in the implementation phase and will be ready for the analysis activity in the next quarter. The retrieval techniques have been developed and successfully demonstrated.

TECHNOLOGY INTELLIGENCE PROGRAM

The Technology Intelligence Program, started with a local instrumentation company in the third quarter, progressed in three directions this quarter. First, the broad scope current awareness service provided an update to a working card file of abstracts and a monthly CAS report. Second, efforts were focused on developing useful information and systems concepts for a liquid level measuring system for ships and tank farms. Third, six different potential products were identified and information was developed for marketing analysis and development of product concepts.

This quarter was cited as a "tune up" period on TIP with this client. A task system approach evolved from the broad based assistance concept as the best technique of keeping track of progress being made and controlling costs. The task approach will allow the client and WESRAC more flexibility in scope and also maintain cost controls and schedules. Discussions of new TIP contracts with other clients indicate that the task concept is generally preferred. Where "technology probing" is desired, the task can be written to describe the effort.

This quarter has put the first "real world" flavor on the TIP concept. It has revealed a program of definite value to the client, and a magnitude of difference in WESRAC's involvement with the client.

PRODUCT QUALITY

A careful follow-up procedure is being used to determine the degree of customer satisfaction with WESRAC literature searches. In cases where customers were not pleased with the report, supplementary searches have been conducted with excellent results. We feel that our renewal rate which is now 83% reflects improvement in search quality. Part of the increased renewal rate can be traced to the greater care spent in defining the problem before the actual search is begun.

SEARCH ACTIVITY

The search activity for the 4th fiscal quarter showed a substantial improvement over the previous quarter. The number of data banks used in retrospective searches increased 36% while the total subjects searched increased 59%.

V. INFORMATION SYSTEMS

NEW DEVELOPMENTS

DATACON Systems

The DATACON is WESRAC's online data base searching system. It provides the user with the capability to search a selected data base for citations relative to his subject. The system is resident on the IBM 370/155 computer on the USC campus and uses standard terminals for access.

Growth in use and capability was the characteristic of the DATACON systems during this quarter. Internal use of the system in interactive searching for citations pertinent to current problems, development of strategies on selected subjects, and effective search demonstrations revealed both the strengths and weaknesses.

Attention was placed upon strengthening the capability to provide an effective system suitable for client use in their own facilities. The system capability can provide the user with an effective search of the data bases chosen. The interactive mode provides the user with the visibility of the effectiveness of his chosen strategy and allows him to correct it. It stimulates ideas on new directions the search should take. The user has the options to try keywords individually, in parts, or in groups of keywords with Boolean logic. He can walk away with confidence in his strategy or a list of pertinent citations to match his subject.

The limitation this quarter was the small disk space available to use for data base storage. Actions were taken to acquire the first dedicated storage space for the data bases.

This will allow expansion to direct client usage and provide a significant improvement in the scope and depth of online searching.

There were major changes to the operating system software (IBM TSO was installed at the University Computing Center) which required considerable effort to adapt the DATACON system to take advantage of the capabilities of the TSO system. Typical operational problems during such a change caused delays in the progress being made, but operations have become reasonably stable now.

The system has been tested not only within the WESRAC facility, but also in conferences throughout the area. A unique application was a seminar for computer science students (approximately 25) in the Educational-TU classroom. The terminal display was projected on all student monitors and was recorded on video tape. This application could prove to be a useful utilization.

A lecture and demonstration of the DATACON was presented to the Library Science class with approximately 35 students present. The computer techniques were of particular interest to the class since it is the type of approach many libraries will have to take in the future. This lecture is a regular part of the course being presented.

The system has matured and promises to be a significant tool in WESRAC operations. A program has been developed to use the DATACON terminal as an online retrieval system for clinical data in the otology project. The program has been checked out and will be ready for extensive data pro-

cessing in the coming quarter. See Section IV, page 16, for a more detailed discussion.

NEW TECHNOLOGY SOURCES

The following technology sources for manual searching have been added to WESRAC's data banks:

1. Abstracts of World Medicine
2. ERTS (Earth Resources Satellite Photography)
3. Excerpta Medica
4. GEO-REF (Bibliography and Index of Geology)
5. Funk & Scott Index of Corporations and Industries
6. Hospital Literature Index
7. International Pharmaceutical Abstracts
8. Mathematical Reviews
9. Meteorological and Geostrophysical Abstracts
10. Nutrition Abstracts and Reviews
11. Smithsonian Science Information Exchange
12. State of California Codes
13. The Wall Street Journal Index
14. Toxicity Bibliography
15. Toxicon (Toxicology Information Program)
16. U.S. Federal Code
17. U.S. Patents

MISCELLANEOUS

An additional Xerox machine has been installed in the administration building of WESRAC. This will save the time of personnel going to the Information Systems building for copying at no increase in cost.

The computer labels for the "Design Resources" column supplied by Design News will substantially minimize the clerical work associated with processing responses. This will enable WESRAC to reduce the lag time in responding to less than a week.

VI. OUTSTANDING EXAMPLES OF TECHNOLOGY TRANSFER

One of the most important yardsticks of success of a Regional Dissemination Center's activity is the degree to which the technology contained in the RDC's data backs is put to commercial use. While the long-term effects of technology transfers are not always immediately discernible, the following are examples which came to light in 1972. These show the potential benefits that could be derived by others as a result of the services rendered by WESRAC.

1. FLUID PACKED PUMP, ARMCO STEEL CORPORATION -
Los Nietos, Ca.

Business: Manufacturer of subsurface oilwell pumps.

Assistance Provided: Literature search of special applications of jet pumps.

Results: Fluid Packed Pump's own search had not produced sufficient design data for their needs. Referring to WESRAC's search, their chief engineer John Brennan wrote, "The WESRAC specialist interpreted our requirements very well and submitted 44 abstracts from the NASA Data Bank and the Engineering Index. We ordered and received 20 of these. They appear to cover the field quite thoroughly. WESRAC performed a real service for us providing the needed technical publications with little time expenditure on our part."

2. NAVAL CIVIL ENGINEERING LABORATORY - Port Hueneme, Ca.

Business: Material sciences studies primarily in structural applications.

Assistance Provided: Conducted literature search on various aspects of corrosion phenomena.

Results: An extensive information base was required

for a major facilities corrosion project by Mr. James Jenkins, metallurgist at their Material Science Division. Following the completion of the search, Mr. Jenkins wrote that "WESRAC's services were very prompt, complete, and accurate; and your assistance in planning the information gathering procedure for this program was invaluable.

3. ACCURIDE, DIVISION OF STANDARD PRECISION INSTRUMENTS
Sante Fe Springs, Ca.

Business: Manufacture of precision telescoping ball bearing drawer slides.

Results: Accuride's research and design engineer, Julian Striegler, was looking for a means of minimizing friction in linear friction slides without using bearings. Based on a computer search conducted by WESRAC, Accuride was able to successfully apply recent solid lubricant technology to drawer slides.

4. AEROCHEM, INCORPORATED - Orange, Ca.

Business: Chemical milling.

Assistance Provided: Search on noise reduction.

Results: Chief chemist H. C. Lorenzen required literature concerning industrial and jet engine gas turbine acoustical noise. Information on design, handling, shape and size of panels, fastening techniques and possible engine modifications was of interest. According to Mr. Lorenzen, "We gained a great deal of technical background information from your report. In addition, several areas have been

identified in which our specialized manufacturing capabilities may be applied."

VII. APPENDICES

APPENDIX A
Statistics Required by NASA-TUD

TABLE

A-1	Marketing Approaches to Client Prospects
A-2	Contacts with Clients
A-3	Large vs. Small Annual Clients
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A-7	Distribution of WESRAC Users by Type of Business
A-8	Abstracts and Citations Delivered to Clients Compared to Documents Ordered
A-9	Documents Issued by STAR and IAA Categories
A-10	Microfiche Issued by STAR and IAA Categories

Table A-1

MARKETING APPROACHES TO CLIENT PROSPECTS

(By contract quarters beginning Feb. 1, 1971)

	Direct Mail	Tele- phone Contact	Personal Presenta- tion	Group Presenta- tion	Ads (Paid)	Newspaper or Magazine Articles
1st Q 1971	33,100	657	(401)* 318	(374) 11	1	0
2nd Q 1971	28,707	210	(237) 97	(245) 6	2	2
3rd Q 1971	8,525	311	(281) 171	(602) 17	1	6
4th Q 1971	23,319	209	(412) 133	(360) 17	(75,000) 1	2
Total 1971	93,651	1,387	(1,331) 719	(1,581) 51	(75,000) 5	10
1st Q 1972	28,814	350	(275) 110	(163) 13	(500) 1	1
2nd Q 1972	9,894	344	169	(51) 3	(20,000) 1	(103,000) 1
3rd Q 1972	29,941	288	(254) 121	(185) 3	(95,000) 2	(106,000) 1
4th Q 1972	30,073	281	(410) 218	(85) 3	0	(153,000) 3
Total 1972	118,722	1,263	(1,310) 618	(484) 22	(115,500) 4	(362,000) 6

* Estimated number of individuals personally exposed to WESRAC

Table A-2

CONTACTS WITH CLIENTS

(By contract quarters beginning Feb. 1, 1971)

	TECHNICAL OPERATIONS (Applications Engineers)		MARKETING (Clients only)	
	telephone	visit	telephone	visit
1st Q 1971	170	26	128	88
2nd Q 1971	172	28	77	53
3rd Q 1971	190	21	68	57
4th Q 1971	184	29	65	50
Total 1971	716	104	338	248
1st Q 1972	112	32	141	59
2nd Q 1972	191	21	152	49
3rd Q 1972	176	34	158	51
4th Q 1972	202	30	94	89
Total 1972	681	117	545	248

Table A-3
LARGE VS. SMALL ANNUAL CLIENTS
(By calendar quarters)

QUARTER	LARGE	SMALL*	TOTAL
1st Q 1971	22	44	66
2nd Q 1971	26	49	75
3rd Q 1971	24	29	53
4th Q 1971	24	26	50
1st Q 1972	25	29	54
2nd Q 1972	24	31	55
3rd Q 1972	21	33	54
4th Q 1972	29	27	56

* Small is under 500 employees

Table A-4

ANNUAL CONTRACT CLIENTS BY SIC CODE

(Total Contracts on Record)

(By contract quarters beginning Feb. 1, 1971)

SIC Code #	1971				1972			
	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q
1500	0	0	0	0	0	1	2	2
1900	2	3	3	3	2	2	1	2
2600	0	0	0	0	0	0	0	0
2700	0	0	0	0	0	0	0	0
2800	6	6	6	6	3	4	2	2
2900	0	0	0	0	0	0	0	0
3000	0	0	0	0	0	0	0	0
3100	0	0	0	0	0	0	0	0
3200	1	1	1	1	1	1	1	1
3300	1	0	0	0	0	0	0	0
3400	1	1	0	0	1	2	2	1
3500	4	6	6	7	10	7	6	8
3600	11	14	8	8	6	3	4	9
3700	4	3	4	4	4	4	5	5
3800	3	2	4	6	6	6	6	6
3900	1	1	2	2	1	0	0	0
4000	0	0	0	0	0	0	0	0
4100	0	0	0	0	0	0	0	0
4200	0	0	0	0	0	0	0	0

(continued)

Table A-4 (continued)

ANNUAL CONTRACT CLIENTS BY SIC CODE

(Total Contracts on Record)

(By contract quarters beginning Feb. 1, 1971)

SIC Code #	1971				1972			
	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q
4300	0	0	0	0	0	0	0	0
4400	0	0	0	0	0	0	0	0
4500	0	0	0	0	0	0	0	0
4600	0	0	0	0	0	0	0	0
4700	0	0	0	0	0	0	0	0
4800	1	0	0	0	0	0	0	0
4900	1	1	1	1	0	0	0	0
5000	2	1	1	1	0	0	1	1
6000	0	0	0	0	0	0	0	0
7300	8	7	8	9	9	6	5	5
7800	1	1	1	1	1	1	1	1
8000	1	1	1	1	1	1	4	4
8200	0	0	0	0	0	1	1	1
8600	0	0	0	0	0	0	0	0
8900	9	7	8	10	9	10	5	6
9100	1	1	1	1	2	2	2	1
9200	0	0	0	0	0	0	0	0
9300	0	0	0	0	0	0	0	0
9900	0	0	0	0	0	0	0	0
Total	58	56	55	61	56	51	49	55

Table A-5

SPECIAL CLIENTS^a

(By contract quarters beginning Feb. 1, 1971)

	SEARCH BUYERS ^b		OTHER SERVICE BUYERS	TOTAL SPECIAL CLIENTS
	LARGE	SMALL ^c		
1st Q 1971	8	8	35	51
2nd Q 1971	1	12	31	44
3rd Q 1971	1	12	106	119
4th Q 1971	2	7	120	129
1st Q 1972	0	9	110	119
2nd Q 1972	2	5	214	221
3rd Q 1972	2	3	179	184
4th Q 1972	5	3	164	172

^a Special clients are those buying individual searches.^b Number of buyers, not frequency.^c Small is under 500 employees.

Table A-6

SPECIAL CLIENTS BY SIC CODE

(By contract quarters beginning Feb. 1, 1971)

SIC Code #	1971				1972			
	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q
1500	0	0	0	0	0	0	0	0
1900	0	0	0	0	0	0	0	0
2600	0	0	0	0	0	0	0	0
2700	0	0	0	0	0	0	0	0
2800	1	1	0	0	0	0	2	2
2900	0	0	0	0	0	0	0	0
3000	1	1	0	0	0	0	0	0
3100	0	0	0	0	0	0	0	0
3200	0	0	0	0	0	0	0	0
3300	0	0	0	0	0	0	0	0
3400	1	0	0	0	0	0	0	0
3500	1	0	0	1	1	1	0	0
3600	4	0	2	0	0	0	0	0
3700	2	0	0	0	0	0	0	1
3800	3	0	0	2	0	0	0	1
3900	0	0	0	0	0	0	0	0
4000	0	0	0	0	0	0	0	0
4200	0	0	0	0	0	0	0	0

(continued)

Table A-6 (continued)

SPECIAL CLIENTS BY SIC CODE

(By contract quarters beginning Feb. 1, 1971)

SIC Code #	1971				1972			
	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q
4400	0	0	0	0	0	0	0	0
4500	0	0	0	0	0	0	0	0
4600	0	0	0	0	0	0	0	0
4700	0	0	0	0	0	0	0	0
4800	0	0	0	0	0	0	0	0
4900	0	0	0	0	0	0	0	0
5000	0	0	0	0	0	0	0	0
6000	0	0	0	1	0	0	0	0
7300	0	1	0	1	0	0	0	0
7800	0	0	0	0	0	0	0	0
8000	1	0	0	0	0	0	0	0
8200	0	9	9	4	6	5	1	1
8600	0	0	0	0	0	0	0	0
8900	1	1	2	0	2	1	3	3
9100	1	0	0	0	0	0	0	0
9200	0	0	0	0	0	0	0	0
9300	0	0	0	0	0	0	0	0
Total	16	13	13	9	9	7	6	8

Table A-7

DISTRIBUTION OF WESRAC USERS* BY TYPE OF BUSINESS

(By contract quarters beginning Feb. 1, 1972)

TYPE OF BUSINESS	1 9 7 2			
	1st Q	2nd Q	3rd Q	4th Q
INDUSTRIAL	59%	72%	64%	69%
COMMERCIAL	15	8	11	12
GOVERNMENTAL	3	6	6	5
MEDICAL	2	2	4	4
UNIVERSITY	6	6	6	5
OTHER	15	16	19	5

*Does not include document buyers. .

Table A-8

ABSTRACTS AND CITATIONS DELIVERED TO CLIENTS
COMPARED TO DOCUMENTS ORDERED

(By contract quarters beginning Feb. 1, 1971)

	ABSTRACTS AND CITATIONS	HARD COPY AND MICROFICHE
1st Q 1971	2,859	475
2nd Q 1971	4,381	272
3rd Q 1971	1,734	501
4th Q 1971	6,795	494
Total 1971	15,769	1,742
1st Q 1972	4,838	367
2nd Q 1972	3,529	299
3rd Q 1972	5,020	487
4th Q 1972	7,212	230
Total 1972	20,599	1,383

Table A-9

DOCUMENTS ISSUED

BY STAR AND IAA CATEGORIES

(By contract quarters beginning Feb..1,1971)

Cate- gory	1971					1972				
	1st Q	2nd Q	3rd Q	4th Q	Total	1st Q	2nd Q	3rd Q	4th Q	Total
1	1	1	0	0	2	1	1	0	0	2
2	25	4	13	3	45	3	3	1	5	12
3	4	4	5	2	15	5	0	4	3	12
4	11	4	3	1	19	2	4	1	4	11
5	19	2	2	15	38	7	7	1	1	16
6	6	0	0	7	13	1	0	1	0	2
7	4	2	5	15	26	5	1	1	3	10
8	10	15	3	8	36	3	1	0	0	4
9	5	3	7	8	23	1	5	1	0	7
10	9	4	1	1	15	0	0	0	0	0
11	4	5	1	3	13	3	2	1	0	6
12	3	3	1	0	7	2	0	4	0	6
13	6	20	12	25	63	8	3	2	1	14
14	22	10	6	23	61	15	13	2	7	37
15	9	10	21	13	53	20	1	2	2	25
16	4	1	2	1	8	3	0	1	1	5
17	13	21	25	17	76	10	15	2	11	38
18	20	1	19	10	50	9	7	0	5	21

(continued)

Table A-9 (continued)

DOCUMENTS ISSUED

BY STAR AND IAA CATEGORIES

(By contract quarters beginning Feb. 1, 1971)

Category	1971					1972				
	1st Q	2nd Q	3rd Q	4th Q	Total	1st Q	2nd Q	3rd Q	4th Q	Total
19	3	2	1	3	8	3	0	2	0	5
20	4	5	8	6	23	2	6	0	2	10
21	8	7	3	1	19	2	0	0	0	2
22	0	1	0	0	1	0	1	1	0	2
23	3	4	0	2	9	4	0	1	0	5
24	1	1	1	0	3	1	0	0	0	1
25	11	0	2	1	14	0	0	0	0	0
26	2	2	1	0	5	0	0	0	0	0
27	1	2	0	3	6	0	0	0	0	0
28	2	4	1	1	8	1	1	0	0	2
29	1	0	1	1	3	1	0	0	0	1
30	3	3	9	10	25	4	1	0	0	5
31	2	0	0	4	6	2	5	0	0	7
32	22	11	14	20	67	7	13	3	20	43
33	2	4	13	1	20	14	1	0	1	16
34	6	4	1	5	16	0	0	1	2	3
Other	175	56	300	243	774	228	200	132	157	717
Total	421	216	481	452	1570	367	291	164	225	1047

Table A-10

MICROFICHE ISSUED

BY STAR AND IAA CATEGORIES

(By contract quarters beginning Feb. 1, 1971)

Category	1971					1972				
	1st Q	2nd Q	3rd Q	4th Q	Total	1st Q	2nd Q	3rd Q	4th Q	Total
1	0	0	0	0	0	0	1	0	0	1
2	0	1	0	0	1	0	1	0	1	2
3	1	7	0	1	9	0	0	0	0	0
4	10	0	0	0	10	0	0	0	0	0
5	9	0	0	2	11	0	0	0	0	0
6	1	0	0	0	1	0	0	0	0	0
7	2	1	1	1	5	0	0	0	0	0
8	8	2	2	2	14	0	0	0	0	0
9	3	3	0	0	6	0	0	0	0	0
10	1	2	2	0	5	0	0	0	0	0
11	0	0	0	0	0	0	0	0	1	1
12	0	9	0	0	9	0	0	0	0	0
13	0	1	0	0	1	0	0	0	0	0
14	7	4	0	3	14	0	0	0	0	0
15	2	3	1	1	7	0	1	0	0	1
16	3	0	0	0	3	0	0	0	0	0
17	0	3	0	0	3	0	1	0	0	1
18	2	4	1	0	7	0	0	0	0	0

(continued)

Table A-10 (continued)

MICROFICHE ISSUED

BY STAR AND IAA CATEGORIES

(By contract quarters beginning Feb. 1, 1971)

Cate- gory	1971					1972				
	1st Q	2nd Q	3rd Q	4th Q	Total	1st Q	2nd Q	3rd Q	4th Q	Total
19	0	1	1	0	2	0	0	0	0	0
20	0	0	0	0	0	0	1	0	0	1
21	0	2	2	0	4	0	0	0	1	1
22	0	0	0	0	0	0	1	0	0	1
23	1	0	0	1	2	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0
25	0	1	0	0	1	0	0	0	0	0
26	1	0	0	0	1	0	0	0	0	0
27	0	2	1	0	3	0	0	0	0	0
28	0	2	1	0	3	0	0	0	0	0
29	0	1	1	0	2	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0
31	0	2	1	0	3	0	1	0	1	2
32	1	1	0	2	4	0	0	0	0	0
33	0	0	0	0	0	0	0	0	1	1
34	2	0	0	1	3	0	0	0	1	1
Other	0	4	0	28	32	0	1	0	1	2
Total	54	56	14	42	166	0	8	0	7	15

APPENDIX B

PUBLICITY AND PROMOTION

The following article appeared in Southern California Business, December 5, 1972.

Horne Heads Up Task Force **Job Generation, Economic Development Probed**

In the early sixties the Los Angeles Area Chamber of Commerce demonstrated an interest in technology transfer by the creation of a task force out of which came several major contributions to the local economy.

Presently a task force headed by Mr. C. F. Horne is concerned with job generation and economic development through technology utilization. One of the groups currently assisting and working with the Chamber's task force is WESRAC, the Western Research Application Center.

The Southern California economy is vitally dependent on the continued use of new technology to create new products, improve old ones or increase productivity of management. Authorities have said that each new job created through new or improved technology results in eight other supporting or related jobs.

The Western Research Application Center is a stimulant to technological advance by serving as the link between technological breakthroughs and their application to the business needs of the community.

Recently the Pnumetrics Corporation of Northridge, Calif., was faced with the

formidable task of developing a carburetion kit for safely converting internal combustion engines from gasoline to natural gas power.

The Pnumetrics Corporation's success as a bidder on a government program to develop such a kit was due in no small measure to the results of a search of applicable technology conducted by WESRAC.

What is WESRAC? The Western Research Application Center, as it is officially known, is one of the six regional non-profit dissemination centers established by the National Aeronau-

tics and Space Administration to help non-defense business and industry to utilize government supported technological developments.

Since its establishment in 1967 as part of the University of Southern California Graduate School of Business, WESRAC has served hundreds of California companies in a wide variety of industries.

The Pnumetrics story is not unique. Assistance has been provided in solving more than 1,000 problems presented by WESRAC's clients.